Genus	Vol. 13 (2): 153-163	Wrocław, 30 VI 2002

Studies on Xerophloeini leafhoppers with description of *Pariacaca icanoensis* gen. and sp. nov. from Argentina (Hemiptera: Cicadomorpha: Cicadellidae: Ledrinae)

JACEK SZWEDO
Museum and Institute of Zoology, Polish Academy of Sciences, Wilcza 64, PL 00–679 Warszawa,
e-mail: szwedo@miiz.waw.pl

ABSTRACT. *Pariacaca icanoensis* gen. et sp. nov. of the tribe Xerophloeini from Northern Argentina is described. It is allied to genera *Xerophloea* GERM. and *Proranus* SPIN. Recent views on the classification within Ledrinae and placement of Xerophloeini within the group are reviewed. The taxonomic position of *Ohausia nigra* SCHMIDT is also discussed and *Mesodicus foveolatus* FIEBER is placed as a senior synonym of *Xerophloea robusta* LAWSON syn. nov.

Key words: entomology, taxonomy, new genus, new species, new synonyms, *Pariacaca*, Xerophloeini, Ledrinae, Cicadellidae, Hemiptera

INTRODUCTION

The subfamily Ledrinae (*sensu lato*), treated by some authors (METCALF 1962, MÜLLER 1969, EMELJANOV 1987) as a distinct family, is a group of phylogenetically rather old leafhoppers comprising about 70 extant genera with over 400 species. These leafhoppers are usually medium–sized to large, with yellowish, brownish or greenish coloration. Most species have the head usually strongly produced and often spatulate, with ocelli on vertex distant from margin or (in Stenocotini) in marginal grooves; lateral frontal sutures on the face are partially or completely obsolete. Tegmina are macropterous, often with supranumerary veins. The hind femur is characteristic of the group, with three short and stout macrosetae placed apically. Hind tibiae are often flattened, or quadrangular in cross section, with row AD (row I) of distal macrosetae with spinelike bases. Male plates are ligulate,

partially retracted into enlarged sternum VIII. Ledrinae feed mainly on trees and shrubs and are distributed mainly in tropical and subtropical zones of all continents with most species known from the Oriental Region (METCALF 1962). The group seems to be polyphyletic, but there is no universally accepted view on its composition and classification (see discussion below).

Unlike other ledrine tribes, Xerophloeini is restricted to the New World and its members feed on grasses. DIETRICH et al. (2001) included (un-named) 3 genera and 30 species in this group. Earlier, KRAMER (1966) had included the following eight Neotropical genera in Ledrinae (without tribes): *Xerophloea* GERMAR, 1839, *Proranus* SPINOLA, 1850, *Hespenedra* KRAMER, 1966, *Xedreota* KRAMER, 1966, *Bascarrhinus* FOWLER, 1898, *Platyhynna* BERG, 1884, *Clinonana* OSBORN, 1938, and *Ohausia* SCHMIDT, 1911, together with *Ledra episcopalis* WALKER, 1851 and *Hemipeltis* SPINOLA, 1850 as taxa of uncertain position. NIELSON & KNIGHT (2000) mentioned only *Xerophloea* GERMAR and *Xedreota* KRAMER as members of the tribe, and stated *Clinonana* OSBORN and *Ohausia* SCHMIDT of uncertain tribal assignment, notwithstanding certain characters common with Gyponinae. Of these, I consider the genera: *Xerophloea* GERMAR, *Proranus* SPINOLA, *Hespenedra* KRAMER, *Xedreota* KRAMER, and possibly also *Clinonana* OSBORN, to belong to Xerophloeini. After studying the type specimen of *Ohausia* SCHMIDT, characters of hind leg, i.e. very long and slender hind tibia, with complete spinulation (rows PD and AD with a dozen or so setae, row PV with numerous thin setae), as well as characters of the head and hind wing venation, I conclude that its subfamilial placement is uncertain.

SYSTEMATICS

During research on Ledrinae, I had the privilege to study some specimens of Xerophloeini deposited in the Paris Museum and the Hungarian Museum of Natural History. Among them, in the former museum, I found a new genus and species allied to *Xerophloea* GERM., which are described below. In the latter museum I found a female specimen of *Mesodicus foveolatus* FIEBER, 1866, with labels as follows: [handwritten: *Mesodicus / foveolatus /* typ. Fieber]; [handwritten: *foveolatus* Fieb. / printed: Coll. Horváth], [printed: *Mesodicus*. / *foveolatus* Fieb], [handwritten: *Xerophloea* Germ. / (= *Mesodicus* Fieb.) / Jassida neotrop.], [printed: coll. / Hungarian Nat. Hist. / Museum, Budapest]. It is very probable that this specimen is Fieber's type as it matches the original description. The type–locality of *Mesodicus foveolatus* is unknown, but based on this specimen it is from the New World and not "Southern Europe" as originally stated. BERG (1879) and EVANS (1947) believed *Mesodicus* to be a synonym of *Xerophloea* from the New World, but NIELSON (1962) treated *Mesodicus* as *incertae sedis*, as FIEBER's type had not been located. After examination of the above specimen, I found that it has characters common with *Xerophloea robusta* LAWSON (1931), known from north–western United States (NIELSON 1962). I therefore propose the following synonymy:

Xerophloea foveolata (Fieber, 1866)

Mesodicus foveolatus Fieber, 1866: 512, Pl. VII, figs. 8a–e, 501, 514.
Xerophloea robusta Lawson, 1931: Lawson 1931: 164, figs. 2, 2a, **syn. nov.**

Pariacaca n. gen.

Type–species: *Pariacaca icanoensis* n. sp., here designated.

Etymology

Pariacaca — an ancient pre–Inca god of water, rain and storms, as well as a god of creation. Gender: masculine.

Diagnosis

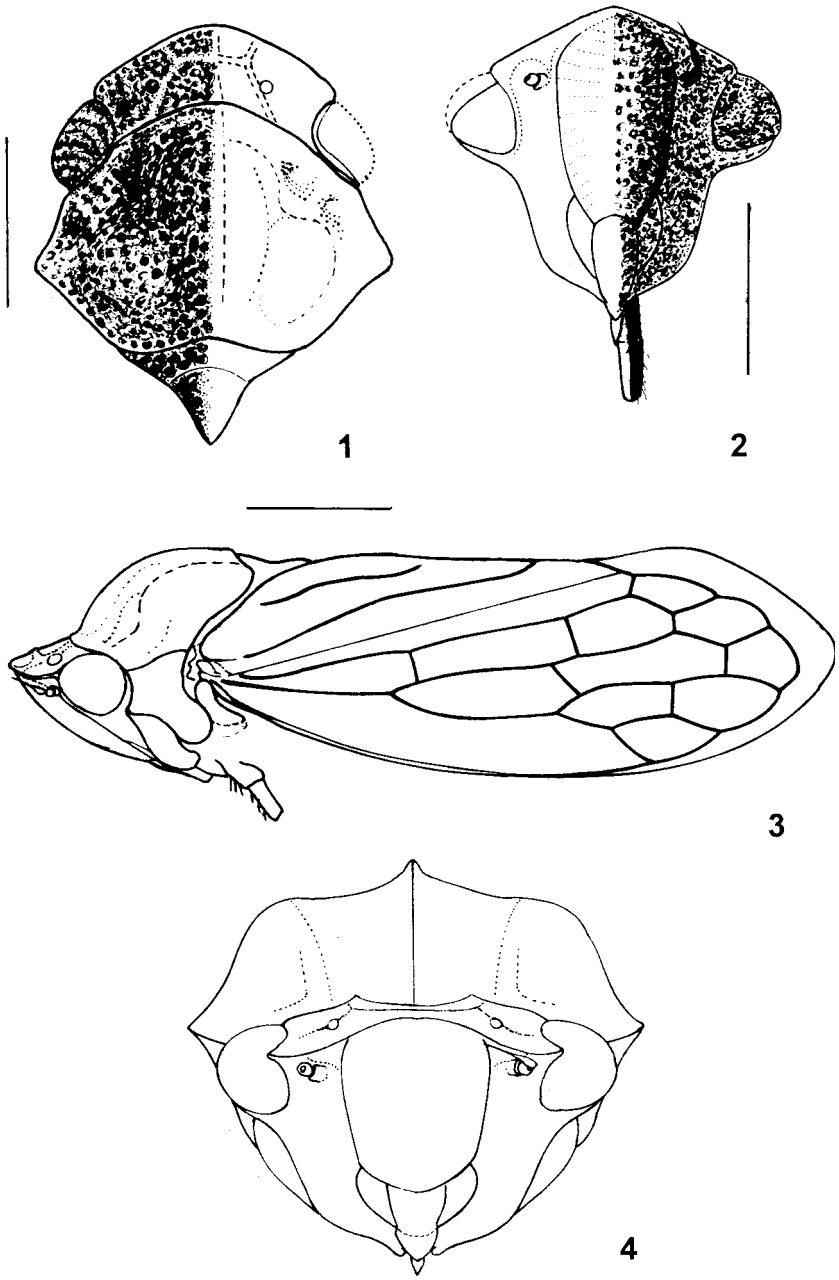
In general appearance similar to the genera *Xerophloea* Germar, 1839 and *Proranus* Spinola, 1850, but distinctly smaller than *Proranus* Spin. Head, in lateral view, declivent toward apex, face not horizontal (in *Xerophloea*, if declivent — than less). Vertex convex, with distinct mediolateral carinae and anteriad transverse carina (transverse carina absent in *Xerophloea*), median carina not complete, present only anteriad of connection with transverse carina. Interocular width of vertex more than twice its mid- length (at most twice its mid length in *Xerophloea*). Anteclypeus protruding below the lower margin of genae. Pronotum distinctly inflated and declivent cephalad, with distinct median carina. Four stout setae on the plantar surface of hind basitarsomere (three in *Xerophloea*). Lobe of pygofer angulately wide in median portion (rounded in *Xerophloea*), with three rows of stout, thick setae and with a dozen or so, longer and more slender setae in lower portion.

Description

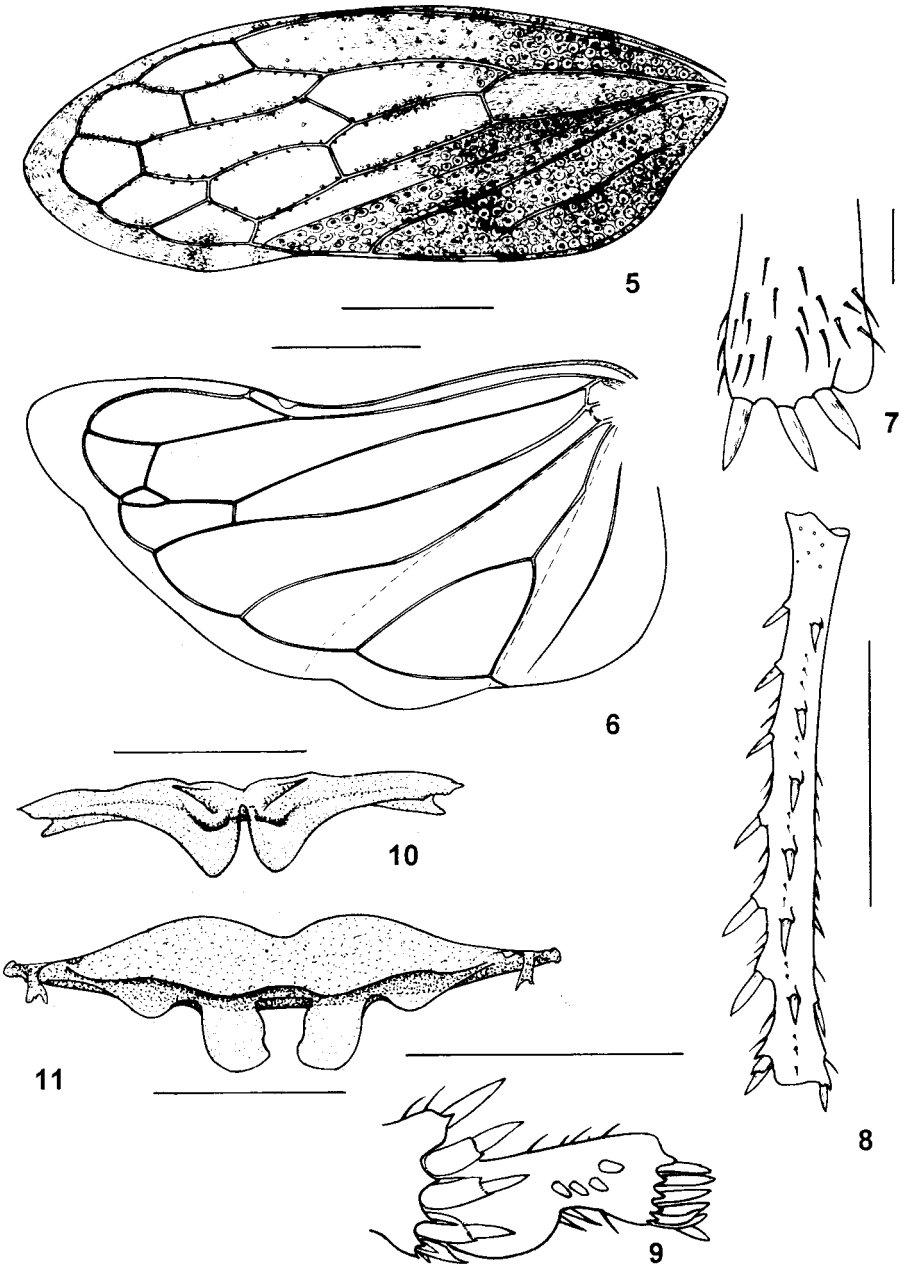
Robust leafhopper with head, pronotum, mesonotum and basal portion of tegmina with numerous circular pits, frequently with a short seta arising from center of each pit (Figs 1, 5 & 18).

Head slightly narrower than pronotum, vertex with anterior margin rounded, in lateral view declivent toward apex, with distinct mediolateral carinae. Disc of vertex convex, with deep posteromedian concavity between lateral carinae and transverse anterior carina. Eyes well developed, ocelli on disc of vertex (Fig. 1). Face in lateral view not horizontal, with frontoclypeus slightly swollen. Anteclypeus slightly swollen in upper portion, with lateral margins slightly diverging, then distinctly converging, lower portion of anteclypeus distinctly exceeding the line of lower angles of genae (Fig. 2). Pronotum large, slightly wider than head, distinctly inflated almost from anterior margin (Fig. 1).

Tegmen with appendix extending around tegmen apex, venation distinct (Fig. 5). Wings with venation pattern as in *Xerophloea*, with four apical cells (Fig. 6).



1-4. *Pariacaca icanoensis*: 1 - anterior part of body in dorsal view, 2 - face, 3 - lateral outline of body, 4 - frontal view (scale bar: 1 mm)



5-11. *Pariacaca icanoensis*: 5 - tegmen, 6 - wing, 7 - tip of hind femur, 8 - hind tibia, 9 - hind basitarsomere, 10 - abdominal apodeme of 1st sternum, 11 - abdominal apodeme of 2nd sternum (scale bar: 1 mm for 5, 6 & 8, 0.5 mm for 9-11, 0.1 mm for 7)

Male genitalia with pygofer lobes wide, with stout setae and fine chaetae (Fig. 12).

Male genital plates elongate with fine chaetae. Styles widened apicad, with obtusely angulate apex and small anteapical projection. Aedeagus laterally compressed, extreme base produced for attachment with connective, sub-basally broadened, tapered anteriorly to nearly tube-like apical part, slightly curved dorsad, gonopore apical (Figs 14–17).

Pariacaca icanoensis n. sp.

Diagnosis

Interocular width of vertex 2.45 times as length of vertex in mid line. Median carina of pronotum distinct, pronotum about 1.45 times as wide as long in mid line. Pronotal width about 1.8 times interocular width of vertex.

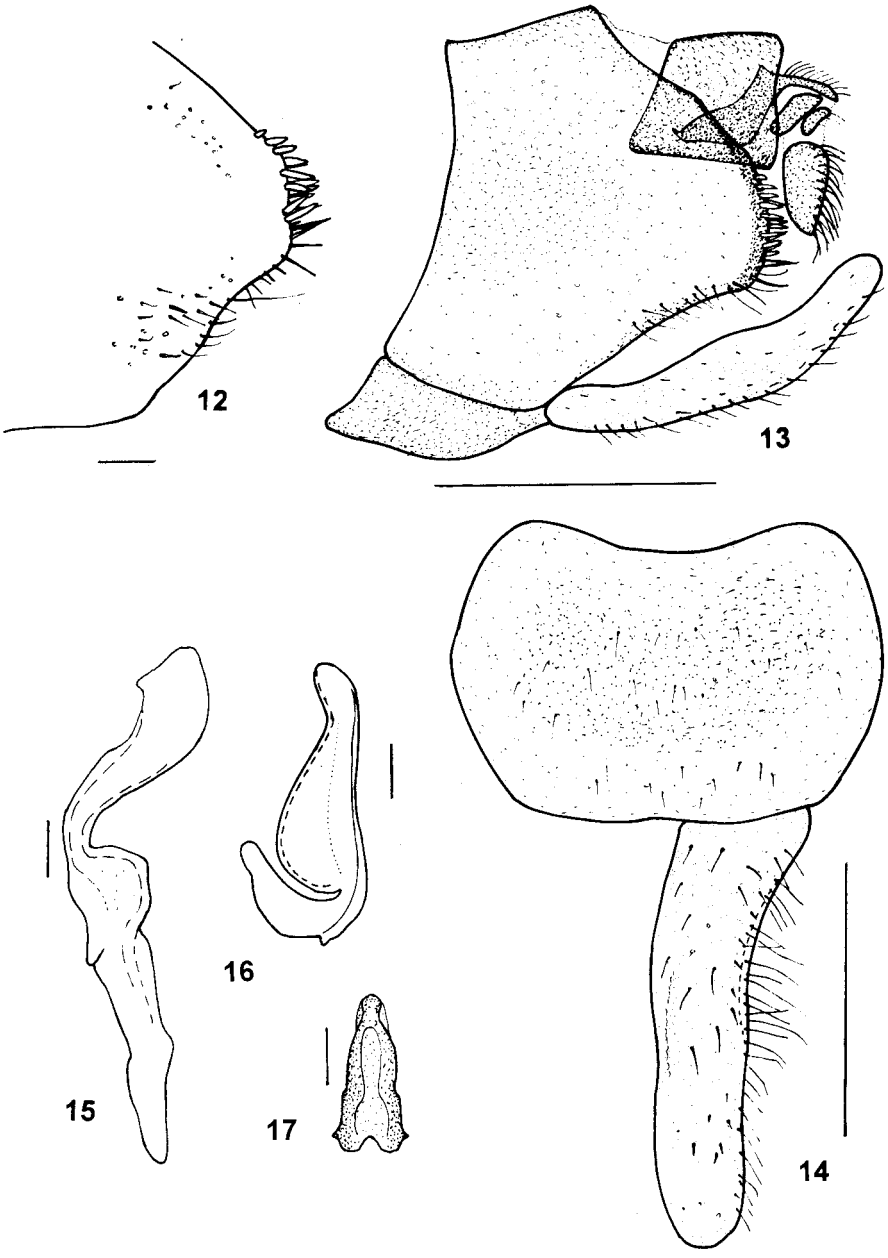
Description

Robust species, length of male 5.75 mm (female not known).

General coloration sordid stramineous, vertex with fused brownish markings, frontoclypeus stramineous, rostrum brownish. Pronotum with tawny, irregular and fused markings on lateral parts of the pronotal bulge, median carina yellowish, scutum sordid stramineous, scutellum with light yellowish median streak and tawny lateral markings. Tegmina with indistinct darker markings on clavus, irregular markings also on veins, apical cubital cell and appendix. Fore legs sordid stramineous with tawny, indistinct transverse bands. Hind femur with irregular tawny markings apicad, hind tibia with a few brownish, irregular transverse bands. Abdomen stramineous, with brownish, indistinct markings.

Head with compound eyes 1.8 mm wide, vertex in mid line 0.44 mm long. Vertex with anterior margin broadly rounded, anterior margin forming a narrow ledge, disc convex, rugose and pitted, interocular width 2.45 times median length. Mediolateral carinae distinct, slightly diverging anteriad and posteriad of transverse anterior carina, median carina distinct only anteriad of transverse carina. Medioposterior concavity between carinae deep. Ocelli on vertex, slightly above the line of the anterior angles of compound eyes, placed on lateral slopes of mediolateral carinae (Fig. 1).

Face (Fig. 2) with swollen frontoclypeus and anteclypeus clearly visible, pitted, pits with short, blunt setae. Face in upper angles, above the compound eyes, 1.13 mm wide, in subocular angles 1.14 mm wide, in lower angles 0.82 mm wide. Frontoclypeus 1.8 times high in mid line as its maximal width, at upper angles, lateral sutures deep and distinct, terminating above the bases of antennae; suture between frontoclypeus and anteclypeus concave. Lateral portions of frontoclypeus with distinct parallel wrinkles – muscle attachments, and shallow concavity in the upper median part of frontoclypeus present. Anteclypeus 0.58 mm high, 0.4 times as wide as high, swollen medially, with lateral margins slightly diverging, slightly



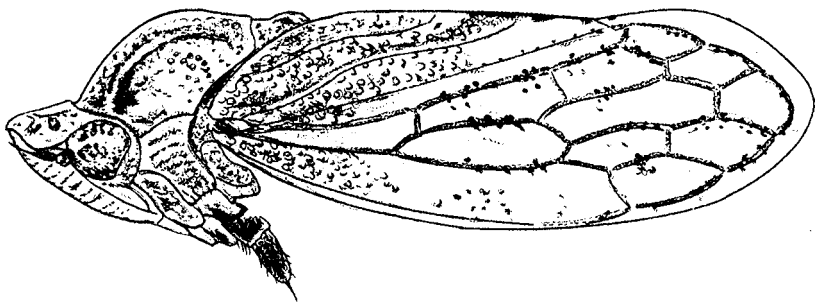
12-17. *Pariacaca icanoensis*: 12 - left lobe of pygofer, 13 - pygofer in left lateral view, 14 - genital valve and left genital plate in ventral view, 15 - genital style, 16 - aedeagus, 17 - connective, 18 - general lateral view (scale bar: 0.5 mm for 13 & 14, 0.1 mm for 12, 14-17)

above of the level of lower angles of genae, then tapering and exceeding lower portion of genae. Clypellus (labrum) 0.16 mm long. Lora narrow, with a few hair–like, blunt setae. Genae slightly concave in lower portion, with distinct emargination and hair–like, blunt setae. Antennae short, 0.5 mm long, placed in the anterolateral portion of concavities between frontoclypeus and compound eyes, antennal ledges ill–defined. Basal segment conical, second segment globular, flagellum 0.34 mm long, widened at base, tapered apicad. Rostrum 0.6 mm long, short, reaching mid coxae, apical segment 1.3 times longer than subapical.

Pronotum 1.34 mm long in mid line, 1.94 mm wide in humeral angles, rugose and pitted, pits with short setae arising from center. Anterior margin distinctly curved, lateral margins diverging posteriad, posterior margin converging, with shallow median concavity. Median length of pronotum three times as length of vertex in mid line, 1.1 times as wide as head with compound eyes. Pronotal bulk with distinct median carina, and less distinct mediolateral ledges, dividing it into three portions (Figs 1 & 4), anterior lobe reaching almost the anterior margin of pronotum, lateral portions convex. The portion between anterior and lateral portion of pronotal bulk concave, with small protuberance reaching anterior margin of pronotum. Mesonotum 0.76 mm long, scutum separated from scutellum by arcuate suture, scutellum slightly swollen (Figs 1, 3, 4 & 18).

Tegmen (Figs 3, 5 & 18) 4.35 mm long, about 2.7 times as long as wide, coriaceous and pitted in anterior portion and on clavus, tapered in apical portion, with appendix extending around tegmen apex. Costal margin thick, ScR+M with quite long common stem, ScR and M forked at the level of 1/3 of tegmen length, R forked at 2/3 of tegmen length, M forked near the apex, three anteapical cells, apical cells short.

Fore legs relatively short; femur 0.82 mm long, quite stout, with rows of short blunt chaetae on ventral and dorsal margins; tibia 0.92 mm long, quadrangular in cross section, with a few thicker setae in rows AD, AV and PV and a few thinner setae on the margins. Basitarsomere and mid tarsomere short subequal in length,



18. *Pariacaca icanoensis*: general lateral view

(about 0.1 mm) with two subapical setae, apical tarsomere distinctly longer (0.3 mm), with rows of three more slender setae on plantar margin and a few setae at apex, arolium and tarsal claws big.

Mid coxa with stout but distinct meracanthal tubercle. Mid femur about 0.92 mm long, thicker than fore femur, tibia and tarsus not preserved.

Hind coxa with small meracanthal tubercle. Hind femur 1.3 mm long, elongate with rows of scarce, short and blunt chaetae along dorsal and ventral margins; macrosetal formula 3 + 0, few quite long setae present (Fig. 7). Hind tibia (Fig. 8) 2.04 mm long, quadrangular in cross section, with row PD with 6 big spines, row AD with 6 big spines, row AV with 4 spines, row PV with 3 spines; a few slender setae are also present between spines; apex of hind tibia with proximal row of 5 chetae, distal row of 5 spurs with fringed base and seta. Basitarsomere 0.44 mm long, shorter than combined length of mid and apical tarsomeres, with distinct carination at base of plantar surface ("heel"), 4 stout spines and 3 setae on margins of plantar surface and 7 apical platellae (Fig. 9). Mid tarsomere 0.24 mm long with 5 apical platellae. Apical tarsomere 0.31 mm long, tarsal claws and arolium big.

Apodemes of 1st sternum quite large, set close together (Fig. 10). Apodemes of 2nd sternum well separated, subquadrate, placed at distance of about their width at base (Fig. 11).

Male genitalia with pygofer lobe broadly angulate in median portion, with three rows of stout, thick setae and with approximately 12 or so, longer and more slender setae in lower portion (Figs 12 & 13). Genital valve almost rectangular (Fig. 14). Genital plate ligulate with rounded apex and fine, long chaetae (Figs 13 & 14). Anal tube short, 11th segment with apodeme present, long, thin setae in dorsal portion, completing sclerite and cercal sclerite distinct, anal style almond–shape with long, thin setae (Fig. 13). Connective stout and elongate (Fig. 17). Styles widened in apical portion, with obtusely angulate apex and small anteapical projection (Fig. 15). Aedeagus laterally compressed, with extreme base produced for attachment with connective, base broadened as wide, high, tapered anteriad portion, apical part nearly tube-like, slightly curved dorsad, gonopore apical (Fig. 16). Female not known.

MATERIAL EXAMINED

Holotype, male. Right compound eye and mid tibia missing. Labelled [bluish label with printed "MUSEUM PARIS / CHACO DE SANTIAGO DEL ESTERO / BORDS DU RIO SALADO. / ENV. DE ICAÑO / E.–R. WAGNER 1910"]. Stored in the Museum National d'Histoire Naturelle, Paris.

CLASSIFICATION OF LEDRINAE

Based on the fossil evidence, Ledrinae seem to be an old group. SHCHERBAKOV (1992) discussed the characters of Upper Cretaceous Jascopidae and Lower Cretaceous Paracarsonini and included these fossils in Ledrinae. However, the subdivi-

sions within Ledrinae and the number and status of its lower taxa are still unclear. At one time or another the following tribes have been included: Ledrini, Xerophloeini, Petalocephalini, Koebeliini and Thymbrini (METCALF 1962; OMAN, KNIGHT & NIELSON 1990). It is very probable that this group is polyphyletic as has been suggested by the molecular data (DIETRICH et al. 2001). DIETRICH (2000) believed Petalocephalini to be a synonym of Ledrini and similarly FLETCHER (2002) concluded that it had dubious merit. The Australian Stenocotini were considered a separate subfamily by EVANS (1969) and according to molecular data, they form an independent lineage related to Tartessinae (DIETRICH et al. 2001). Australian–Oriental Thymbrini were listed as a subgroup of the Nearactic Koebeliini by METCALF (1962), but should be treated as a distinct subfamily (EVANS 1969, NIELSON 1985, DIETRICH 2000). They differ from Koebeliini in having three rather than two apical setae on the hind femur and in the dorsal or marginal placement of the ocelli, whereas in Koebeliini, the ocelli are clearly on the face and remote from the apex of the head (FLETCHER 2002). Koebeliinae is often treated as a subfamily (OMAN 1949, KRAMER 1966, EVANS 1969, NIELSON 1985, DIETRICH 2000) and DIETRICH et al. (2001) considered it derived from Deltocephalinae. Ledrini and Xerophloeini were the only two tribes included in Ledrinae by HAMILTON (1983), the remainder being transferred to other subfamilies. The inclusion of the latter in the subfamily is however uncertain as according to molecular data, it forms a distinct lineage related to Aphrodinae (DIETRICH et al. 2001).

ACKNOWLEDGEMENTS

I am indebted to Dr. THIERRY BOURGOIN (MNHN, Paris) and Mr. ANDRÁS OROSZ (HNHM, Budapest) for the privilege of studying specimens. I wish to thank also Mr. MICK D. WEBB (NHM, London) for the valuable comments and discussion during preparation of the manuscript and Mrs. KRYSTYNA WARCHAŁ for language improvement. The research was partly funded by the State Committee for Scientific Research (Komitet Badań Naukowych) grant No. 6P04C 003 16.

REFERENCES

BERG, C., 1879. Hemiptera Argentina (Continuacion). Anal. Soc. Cien. Arg., **8**: 241–272.

DIETRICH, C.H., 2000. Guide to the Subfamilies of Leafhoppers (Cicadellidae). http://www.inhs.uiuc.edu/~dietrich/subfam/guide.html

DIETRICH, C.H., RAKITOV, R.A., HOLMES, J.L., BLACK, IV W.C., 2001. Phylogeny of the Major Lineages of Membracoidea (Insecta: Hemiptera: Cicadomorpha) Based on 28S rDNA Sequences. Molecular Phyl. Evol., **18**(2): 293–305.

EMELJANOV, A.F., 1987. Phylogeny of cicadids (Homoptera, Cicadina) by comparative morphological data. Trudy Vsesoyuz. Entomol.Obsc. Morphological principles of insect phylogeny. Nauka, Leningrad, **69**: 19–109. [In Russian]

EVANS, J.W., 1947. A natural classification of leaf–hoppers (Jassoidea, Homoptera). Part 3. Jassidae. Trans. R. Entomol. Soc.London, **98**(6): 105–271.

—, 1969. Characteristics and Components of Ledrinae and Some New Genera and New Species From Australia and New Guinea (Homoptera: Cicadellidae). Pacific Insects, **11**(3–4): 735–754.

FIEBER, F.X., 1866. Neue Gattungen und Arten in Homopteren. Verh.Kaiser.–König. Zool.–bot. Ges. Wien, **16**: 497–516.

FLETCHER, M.J., 2002. Petalocephalini discussion. http://www.agric.nsw.gov.au/Hort/ascu/leafhop/petalo.htm

HAMILTON, K.G.A., 1975. Additional characters for specific determination in Nearctic *Xerophloea* (Rhynchota: Homoptera: Cicadellidae). Can. Ent., **107**: 943–946.

—, 1983. Classification, morphology and phylogeny of the family Cicadellidae (Rhynchota: Homoptera). [In:] KNIGHT W.J., PANT N.C., ROBERTSON T.S., WILSON M.R. (Eds.). Proceedings of the 1st International Workshop on Leafhoppers and Planthoppers of Economic Importance. Commonwealth Institute of Entomology, London, 15–37.

KRAMER, J.P., 1966. A revision of the New World leafhoppers of the subfamily Ledrinae (Homoptera: Cicadellidae). Trans. Amer. Entomol. Soc., **92**: 469–502.

LINNAVUORI, R., DELONG, D.M., 1977. The leafhoppers (Homoptera: Cicadellidae) known from Chile. Brenesia, **12&13**: 163–267.

METCALF, Z.P., 1962. General Catalogue of the Homoptera. Fasc. VI. Cicadelloidea. Pt 4. Ledridae. (U.S. Dept of Agriculture). 1–147.

MÜLLER, H.J., 1969. Untersuchungen über die intrazellulare Symbiose einiger Aetalionidae, Eurymelidae and Cicadellidae (Homoptera – Auchenorrhyn*cha*). Zool. Jahrb. System., **96**: 558–608.

NIELSON, M.W., 1962. A revision of the genus *Xerophloea* (Homoptera, Cicadellidae). Ann. Entomol. Soc. Amer., **55**: 234–244.

—, 1985. Leafhopper Systematics. [In:] NAULT L.R., RODRIGUEZ J.G. (Eds.). The Leafhoppers and Planthoppers. John Wiley & Sons, New York. 11–39.

NIELSON, M.W., KNIGHT, W.J., 2000. Distributional patterns and possible origin of leafhoppers (Homoptera, Cicadellidae). Rev. Bras. Zool., **17**(1): 81–156.

OMAN, P., 1949. The Nearctic leafhoppers (Homoptera, Cicadellidae). Mem. Washington Entomol. Soc., **3**: 1–253.

OMAN, P.W., KNIGHT, W.J., NIELSON, M.W., 1990. Leafhoppers (Cicadellidae): A Bibliography, Generic Check–list and Index to the World Literature 1956 – 1985. CAB International Institute of Entomology. 1–368.